Snow and Sea Ice Algorithm Readiness for C4

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MODIS Land Collection Version 4 (C4) Reprocessing Review

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GSFC, Greenbelt, MD

MOD10_L2 --- PGE07

Benefits of Changes for C4

Added a new snow cover SDS in which clouds are masked
with a subset of the cloud test flags (liberal cloud mask)
from MOD35_L2.

Enhanced ability to map snow in some situations by decreasing cloud
obscuration and/or some false cloud detection.   In some situations
clouds are not masked and falsely identified as snow.

The enhanced ability to map snow was of greater value
than the increased erroneous snow mapping.

This SDS is intended for research and users focused on specific
regions using only the swath product.

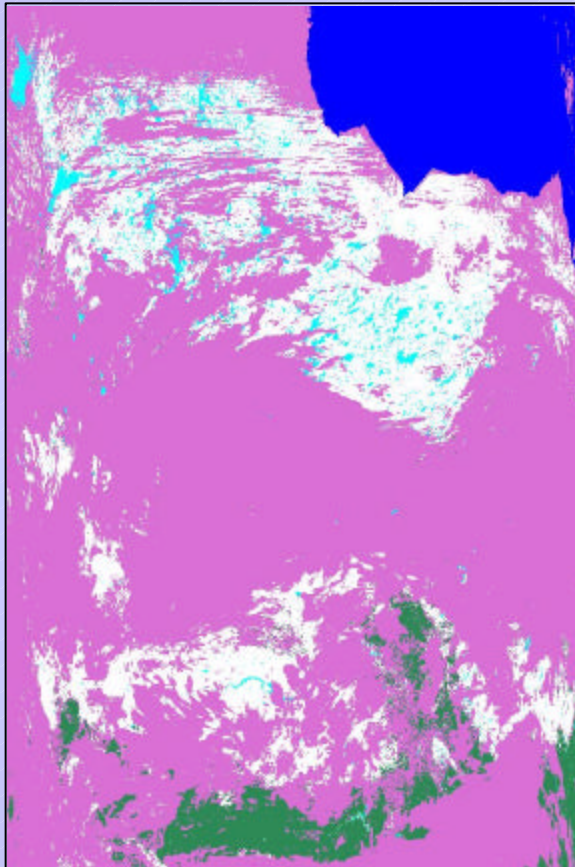This new snow cover SDS is NOT passed to L2G and higher products.

MODIS swath 12 March 2002 1750 UTC
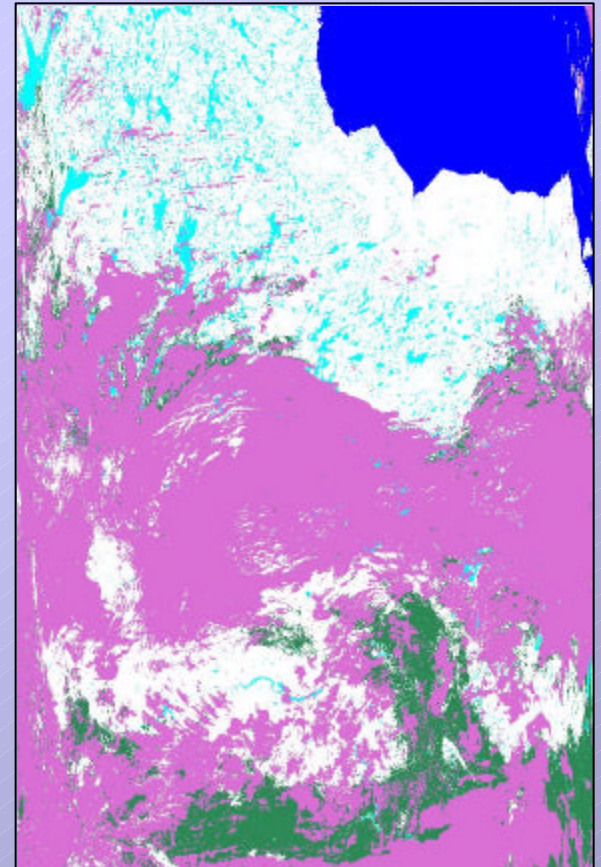
MODIS bands 1,4,6
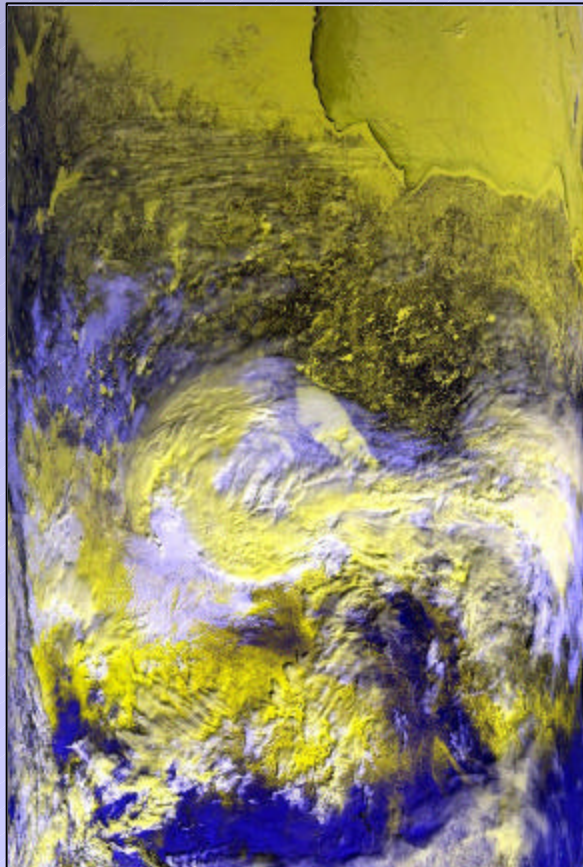
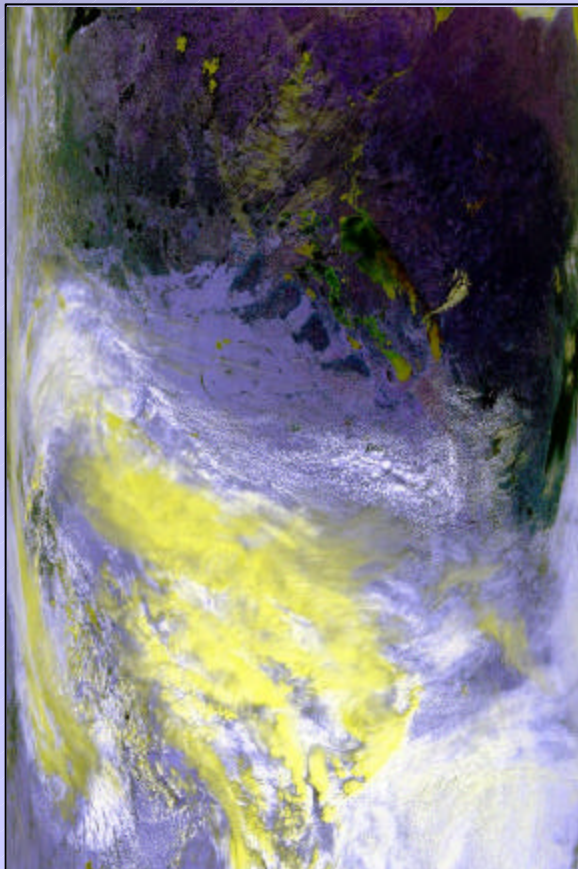Snow map with conservative cloud mask

22% snow; 71% cloud

Snow map with liberal cloud mask

39% snow; 47% cloud

MODIS Swath 4 June 2001 1805 UTC
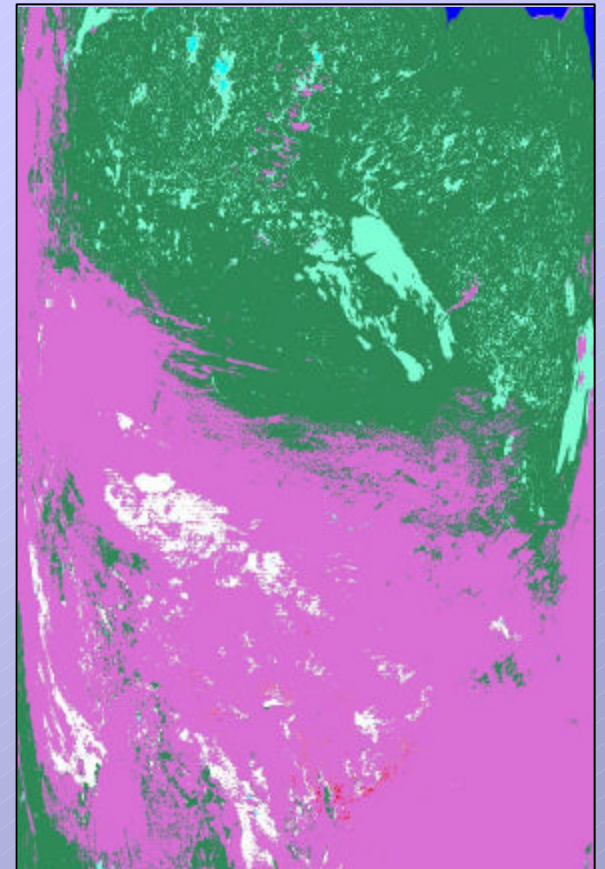
MODIS bands 1,4,6

Snow conservative
cloud mask

Snow liberal cloud
mask

3% snow/cloud error

Lake
Winnipeg

MOD10_L2 --- PGE07

Benefits of Changes for C4

Raised the estimated surface temperature screen threshold to 283K.

This allowed for enhanced and more accurate mapping of snow cover in transition seasons and mixed pixel situations.

MOD10_L2 --- PGE07

Remaining Known Issues

Snow/cloud confusion remains in the,

> MOD35_L2 summary result and in the subset of cloud tests used for the liberal cloud mask.

Algorithm must be changed for use with Aqua data because of the lost detectors in MODIS band 6.

MOD10_L2 --- PGE07

Future Changes in C4 or C5

Change in use of cloud mask flags in C4. Affects only the snow SDS generated with liberal cloud mask. That SDS is NOT passed to downstream products.

Perhaps revise the estimation of land surface temperature in C4 or C5.

Integrate a revised snow algorithm for Aqua data in C4. MOD and MYD will probably be different.

MOD10A1 --- PGE43

Benefits of Changes for C4

Changed to Sinusoidal projection, easier for users.

All MODIS land products changed to sinusoidal projection.

MOD10A1 --- PGE43

Remaining Known Issues

Need for improved scoring algorithm for selecting the observation for a day from the L2G data products. In the current algorithm the most favorable observations are not always selected.

Current scoring algorithm does not include solar elevation as a criterion. Selection is biased to chronological order of input data.

MOD10A1 --- PGE43

Future Changes in C4 or C5

Integrate a revised scoring algorithm for selecting the observation for the day from the L2G data. Revised scoring algorithm will include solar elevation in C4

This change will have a positive effect on the MOD10C1 and MOD10C2 products.

Integrate 500m snow albedo algorithm and SDS in the data product in C4

Anticipate adding polar projection for the snow products. (New ESDT for polar projection.)

MOD10C1 --- PGE46

Benefits of Changes for C4

Improved definition of the terminator line resulting in a smoother line.

Changed snow cover percent calculation to avoid errors in the amount reported

Integrated a snow impossible mask that eliminates mapping of snow in regions of the world where snow should be a very rare event.

MOD10C1 --- PGE46

Remaining Known Issues

Some snow mapping errors are carried through from the MOD10_L2 and MOD10A1 snow maps.

MOD10C1 --- PGE46

Future Changes in C4 or C5

No major changes are anticipated in C4 or C5

MOD10A2 --- PGE45

Benefits of Changes for C4

Changed to Sinusoidal projection, easier for users.

All MODIS land products changed to sinusoidal projection.

MOD10A2 --- PGE45

Remaining Known Issues

No major issues are known.

MOD10A2 --- PGE45

Future Changes in C4 or C5

No major changes are anticipated in C4 or C5

MOD10C2 --- PGE67

Benefits of Changes for C4

Improved definition of the terminator line resulting in a smoother line.

Changed snow cover percent calculation to avoid errors in the amount reported

Integrated a snow impossible mask that eliminates mapping of snow in regions of the world where snow should never occur.

MOD10C2 --- PGE67

Remaining Known Issues

Some snow mapping errors are carried through from the MOD10_L2 and MOD10A1 snow maps.

MOD10C2 --- PGE67

Future Changes in C4 or C5

No major changes are anticipated in C4 or C5

MOD29 --- PGE08

Benefits of Changes for C4

No significant science changes were made for C4.

MOD29 --- PGE08

Remaining Known Issues

Sea ice and cloud confusion.

MOD29 --- PGE08

Future Changes in C4 or C5

May change coefficients in the split-window technique depending on validation results. Changes could be made in C4 or C5.

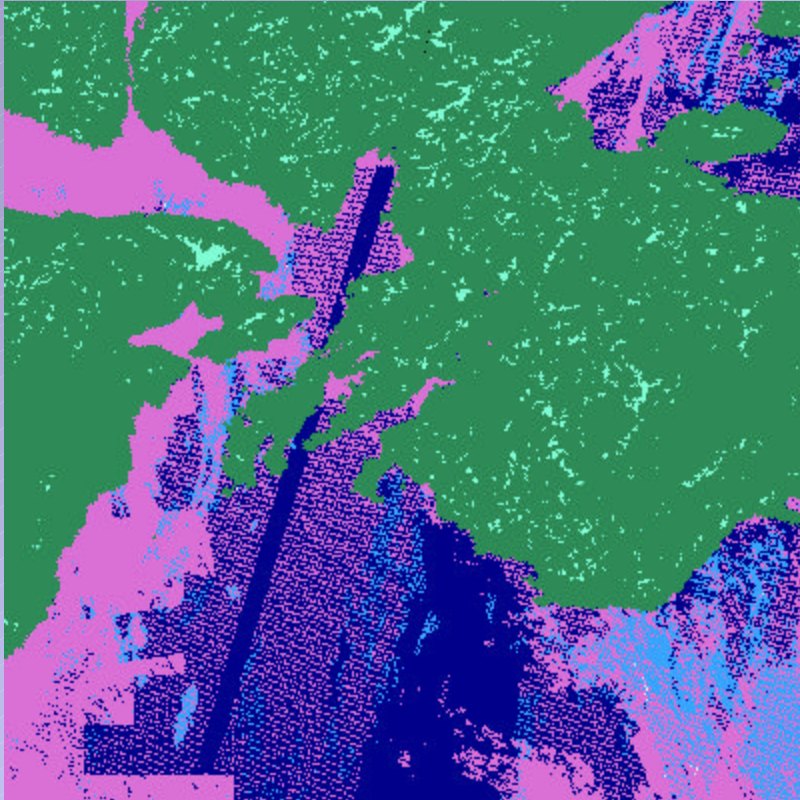Changes in technique used to mask clouds.

MOD29A1 --- PGE44

Benefits of Changes for C4

New scoring algorithm for selection of observation of the day and removal of observation coverage restriction greatly increased quality of the data product
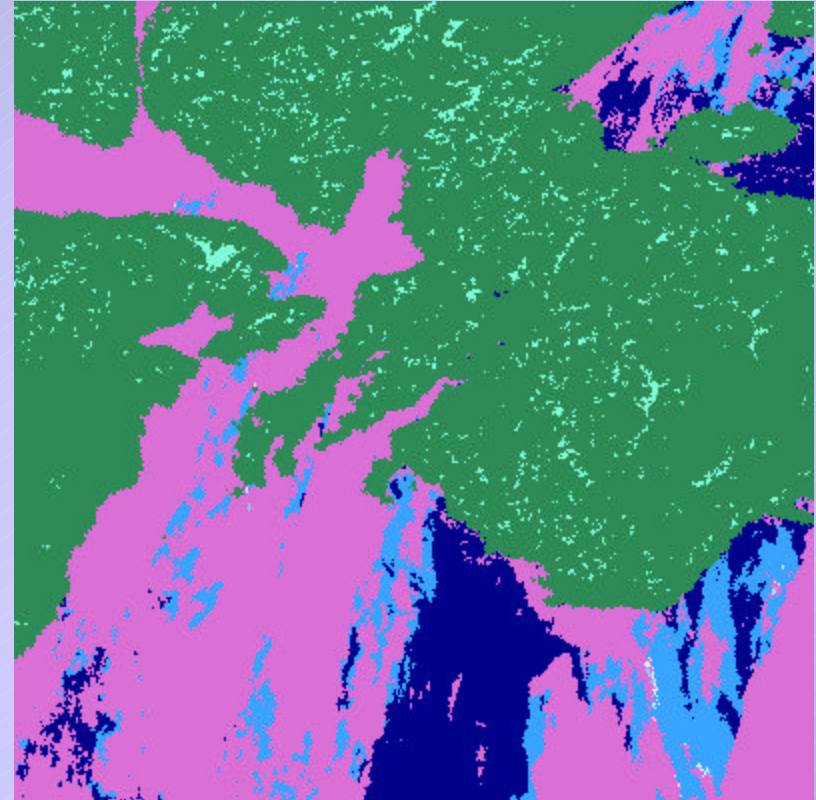
Nearly all cells now contain a data

Features are more coherent

Mapping artifacts greatly reduced
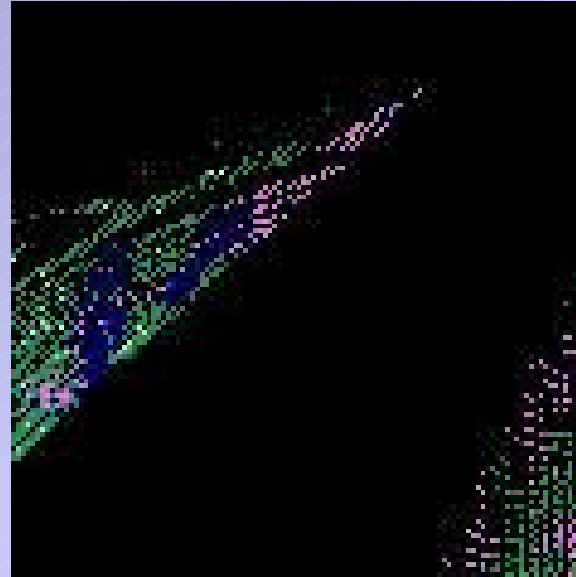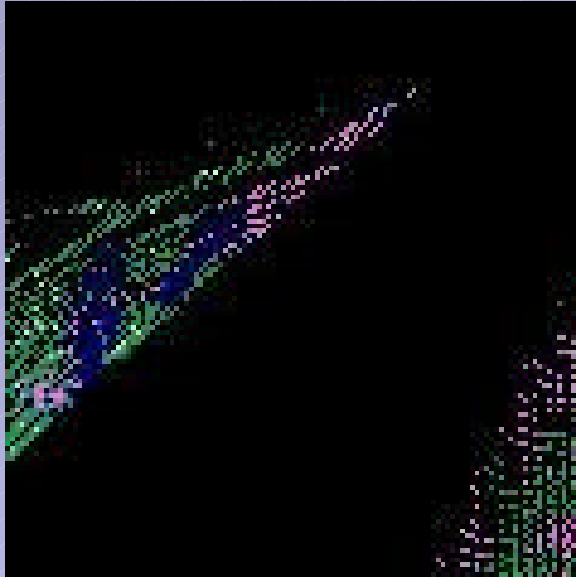
MOD29P1D.A2001198.h0609.003*

Daily sea ice algorithm C3, Ice Surface
Temperature. Problems observed due
to sea ice observation selection
algorithm.

MOD29P1D.A2001198.h0609.004*

from fourth science test

Daily sea ice algorithm C4, Ice Surface
Temperature. New scoring algorithm
for selection of observations.

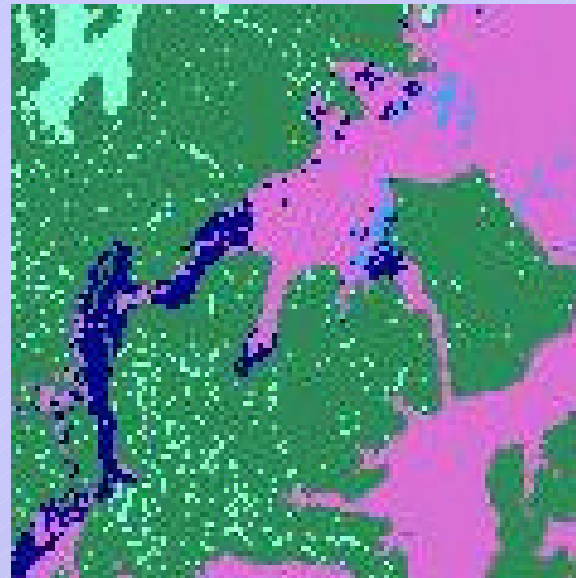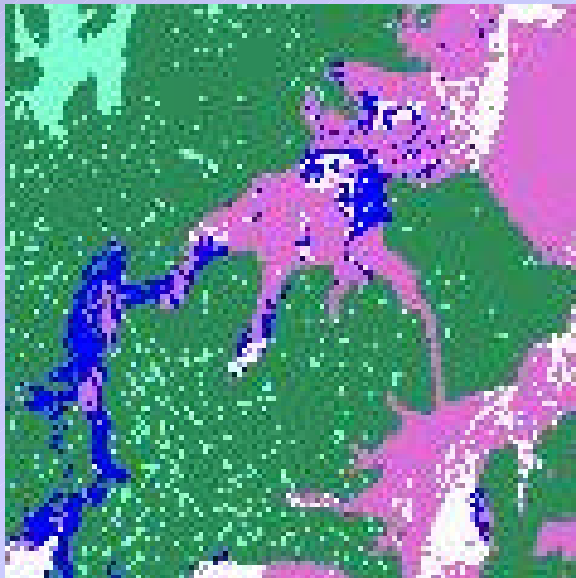**28 July 2002, north polar projection, tile h07v08**

MOD29P1 V003

Sea ice (left), IST (right).
Observation selected by first layer only
and restricted to observation coverage
> 24%. A great amount of data
observations are eliminated from the
map. Only data from
one or two swaths, the earliest ones
of the day are used. Other later near
local noon swaths are not used.
Revised L2G mapping algorithm generated
the L2G input products.
Virtually useless sea ice maps
generated.

MOD29P1 V004

Sea ice (left), IST (right)
Sea ice observation selected by scoring
algorithm. Scoring based on solar
elevation, distance from nadir and
percent of cover. No observation
coverage restriction. Scoring favors
observations near local noon, close to nadir
and with most coverage in a cell.
Revised L2G mapping algorithm generated
the L2G input products. Very useful sea
ice maps generated.

MOD29A1 --- PGE44

Remaining Known Issues

None known.

Evaluation of version 4 of the product continues.

MOD29A1 --- PGE44

Future Changes in C4 or C5

Significant changes are not expected.

MOD29C1 --- PGExx

Benefits of Changes for C4

New ESDT for the cryospheric research community.

Daily global, polar view, of sea ice.

MOD29C1 --- PGExx

Remaining Known Issues

Define the product and implement the algorithm code.

A prototype is done. Spatial resolution is 4km. SDS dimensions, 4321x4321. Sea ice by reflectance and ice surface temperature SDSs. North and South Polar maps in the file.

MOD29C1 --- PGExx

Future Changes in C4 or C5

New ESDT.